

Aesthetics and Its Influence: A Behavioral, Social, and Economic Analysis through NLP Techniques

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Abstract - Aesthetic bias and heuristics profoundly influence societal perceptions and individual behaviors, often without conscious awareness. This paper discussed the importance of aesthetic in the perspective of behavioral economics, highlighting how cognitive shortcuts and unconscious biases shape decision-making and societal norms. It explores how aesthetic preferences, such as beauty standards and demographic trends, influence group behaviors and cultural identity. The role of Natural Language Processing (NLP) is discussed as a tool for identifying and addressing biased language indicated in the text, offering a potential method for mitigating the impact of such biases. While NLP provides valuable insights into the detection of bias, it is not immune to the biases embedded within human data. The paper concludes by emphasizing the need for further development of NLP techniques to promote fairness and self-awareness when identifying bias languages.

INDEX TERMS – AESTHETIC BIAS, BEHAVIORAL ECONOMICS, BIAS DETECTION, NATURAL LANGUAGE PROCESSING

Have you noticed that aesthetic bias and heuristic consequences have become fundamental factors that affect “everyone” around you, even every day of your life? As research has been done specifically on beauty standards, when people’s appearance does not correspond to the public beauty standard, they have a higher risk of missing life-changing points, such as being hired for their dream job. This is specified as a kind of biased perspective. Still, since most people around them follow this standard, they can not notice that this is a biased behavior, and most people who do not fit this beauty standard could be treated unequally by others in society. In this case, NLP (Natural Language Processing) would be a helpful method for people to identify the indicated bias or heuristics in the text. So, this essay will analyze and reveal the importance of aesthetics from the perspective of behavioral economics, which is specified as bias and heuristics. Ultimately, the applicable method of NLP will be introduced as a possible solution.

The phrase “aesthetically pleasing” has become a ubiquitous term currently. The existence of this term has accompanied human civilization throughout history, which means it plays a crucial role in human society. The Merriam-Webster dictionary has defined beauty as “the quality or aggregate of qualities in a person or thing that gives pleasure to the senses or pleurably exalts the mind or spirit.”[1] Research has shown that the human brain always raises a desire for

physiological activity when people see something that is pleasing to the senses or “aesthetically pleasing,” and this phenomenon is defined as stimulation.[2] This indicates that things people consider aesthetically pleasing stimulate their minds, so aesthetics greatly influences different aspects of human lives. For instance, in business, based on the usability effect theory saying that people perceive more aesthetic designs as more straightforward to use than less aesthetic designs, researchers Masaaki Kurosu and Kaori Kashimura conducted research in 1995 testing this principle. [3] Data shows that people are more likely to purchase products with better appearance because they believe they perform better. Appealing colors, patterns, textures, weight, balance, and shape define products with better appearance. So, many companies that sell aesthetically pleasing products can likely boom in sales. The boom in sales relates to the crowds who brought their “aesthetically pleasing” product, the importance of which the term “aesthetically pleasing” has invisibly presented in people's daily lives.

Additionally, aesthetic standards can significantly influence demographic characteristics, as shown in the Dutch population’s average height. The considerable height of the Dutch, often noted as the tallest people in the world, is partly attributed to societal aesthetic preferences that influence marriage patterns during the late 19th and early 20th centuries. [4] Studies have found that “height” is a crucial factor in determining whether a man gets married, but a Dutch man's height does not significantly affect the timing of his marriage. So, eliminating the factor of when a man gets married, short men in the Netherlands (in the bottom 20% for height) faced more challenges in getting married. However, all other men received similar chances, so Dutch women were more likely to marry someone taller than average height, which led to the consequence that the Dutch next generation would possibly appear at an increased rate of height. Thus, the aesthetic preference of Dutch women for taller men led to genetic changes over several generations. However, the increase in Dutch men’s average height would affect their new generation societally. Dutch people would consider taller height to be more aesthetically pleasing since most people around them are very tall, which creates a cycle that eventually becomes a trait of Dutch people.

Next, the text will delve into an analysis and synthesis of the two fundamental factors in behavioral economics from an aesthetic perspective. But first, what is behavioral economics? It is a novel economic system that integrates insights from psychology into traditional

economics.[5] Behavioral economics is particularly significant as it provides a deeper understanding of how psychological biases and heuristics influence individual decision-making and behavior, moving beyond the traditional notion of rational behavior. This field is crucial in the study of aesthetics because both aesthetics and behavioral economics are rooted in psychology, and in theory, they are interconnected. This allows us to objectively analyze how societal perceptions of beauty and value are shaped. By focusing on biases and heuristics, behavioral economics unveils how these cognitive processes drive aesthetic preferences and trends, thereby shaping societal perceptions and cultural identity.

Furthermore, bias is a preference for a repetitive mindset of what people favor or against a person, group of people, or thing.[6] This behavior is usually unconscious and could be harmful or completely neutral. Everyone has bias, and sometimes people do not notice whether they have bias. This is because our brains are biologically designed to perform these quick judgments unconsciously, and the effect and consequence of such behavior are noticeable. For instance, the most typical case is beauty bias. Much research has shown that beautiful people are considered more successful in their professional and personal lives, as they likely give people a better impression and acquire more privilege from others. [7] Sadly, this means if you are just an average-looking person who does not fit in the beauty standard of society, then you would have a higher chance of losing many precious opportunities like promotions, bonuses, or even getting hired for your dream job.

Moreover, research has been done on less attractive individuals who are more likely to get fired, even though they are also less likely to be hired in the first place. [8] This inequality action based on personal bias could significantly affect a person's life by lowering their confidence in themselves and gradually fading their enthusiasm toward life, which creates a huge social impact as time passes. With unconscious discrimination, it is imperative to develop strategies to help people identify their repetitive thinking and address these biases.

On the other hand, heuristics are cognitive shortcuts that allow individuals to make quick decisions and judgments based on past experiences and knowledge. [9] However, it only sometimes provides the best solution. Heuristics is fundamental to creativity because it breaks down the conventional mindset and generates new ideas. [10] With the new ideas generated, society would develop more rapidly and efficiently. Furthermore, heuristics also build up people's cognitive limitations or mindset.[11] Here is an example of a limited mindset shown when you see a person with their hood up in a dark alley and you decide to walk past a bit faster. [12] Here, you see elements like "hood up" and "dark alley" that signal dangerous factors based on your previous experiences; your brain quickly applies an instinctive negative fear response to the situation that could be "dangerous." In this example, past experiences built up a mindset that factors like "hood up" and "dark alley" are

dangerous, so your brain would decide to walk faster. However, this decision could not be "accurate," but it is useful.

Additionally, a more practical case of bias's impact is when we are in the context of the Chinese beauty standard but in a biased perspective. One major factor we must pay attention to is colorism. It specifically means "the preference for lighter over darker skin color," this preference among all Chinese people is rooted in history and can be traced back to the Han dynasty (206 B.C. - 220 A.D.) [13]. During that period, people in the working class, like farmers or laborers, would work under the sun to have a darker skin color, yet the upper class or the wealthier families would not, as they mostly stayed indoors. This means their skin color would be pale. Eventually, this stereotype of skin color became a representative trait of social status that influenced a significant proportion of Chinese people throughout history, and this kind of biased thought remains in modern-day China. The influence of this "culture" has led to a massive market for skin care products that advertise lightening people's skin. According to market research firm Global Industry Analysts, the development of cosmetic products has raised Chinese people's demand for skin whitening products, as a survey has done that proved this by claiming over 70% of consumers believe that their whitening needs have increased. [14] Fortunately, the sale of whitening products is expected to reach 7.8 billion US dollars by 2030. This case of the consequence of bias demonstrated the impact on society, which caused the rise of a new industry.

From all the above cases, aesthetic pleasing in the perspective of bias and heuristics can generate significant social impact. In this case, a method should guide people away from being limited in their bias and heuristics, which are shaped by their previous experience or environment. Natural language processing (NLP) is an artificial intelligence (AI) that uses machine learning to generate language and communicate with humans.[15] NLP works by cooperating with various computational techniques to analyze, understand, and produce human language in a way that machines can process. Firstly, NLP would apply text preprocessing to the information text entered, transforming it into a format of raw text that the machine can process. This begins with tokenization, which splits the text into a more straightforward form, such as breaking a paragraph into a sentence and filtering out insignificant words that reduce words to their root form, such as lowering words like "is" or "the." Then, the next step is to transform the raw text into numerical

Representations for machines to analyze and interpret involve transforming text into structured data using NLP techniques like Bag of Words and TF-IDF. After this, the NLP model will enter the text analysis process to interpret and select texts through different computational methods, such as part-of-speech(POS) that identifies various grammatical roles' meanings and specific words like names. Moreover, the most critical and unique technique is the subset of NLP, "Natural language Understanding (NLU),"

that identifies the indicated meaning in the text, and this subset allows NLP to find similar meaning sentences even if their meaning is not directly conveyed. So, based on the above process, NLP could generate a precise response to the entered text.

NLP would then identify bias or heuristic circumstance through 2 significant factors. The subset NLU processes the meaning behind the text, which could be biased or a heuristic tendency. The NLP machine can also be trained to identify the implied tendency precisely. Training NLP can achieve a state that is used explicitly for precise identifications on indicated bias or heuristic to enhance real-world situations, which would be a more efficient and comprehensive tool for people's self-identification or toward others. However, this machine does have its drawbacks, one of which is that NLP also has a biased tendency. Still, it is just much less affected than humans, and this is due to all the data that NLP collects originating from individual human information. So, "Unless society, humans, and technology become perfectly unbiased, word embeddings and NLP will be biased." [16]

Specifically, continuing the previous example in this essay that a lot of Chinese people have a preference for pale-colored skin, which is a biased beauty standard, yet these people are likely not aware of their colorism. Using the NLP model, they could quickly identify whether their languages show a biased tendency. For example, when they enter "I can walk out my house without putting on the whitest foundation," the NLP model will first convert this sentence to a simpler version that only includes the essential phrases like "walk out" and "whitest foundation.", which is the raw text condition. Then, these raw texts will be transformed into a numerical state, and various special computation functions, such as NLU, will be used to interpret the meaning behind the text. Then, these raw texts will be transformed into a numerical state, and various special computation functions, such as NLU, will be used to interpret the meaning behind the text. In this case, it would possibly identify that this person has a severely biased view toward skin color, leading to her self-abased behavior that prevents her natural skin color from being seen by the public. Then, it creates a response of identification of acquiring skin color-biased tendencies.

Future research can focus on advancing the ability of NLU processing to identify meaning in texts, providing a more accurate and profound interpretation that maximizes the risk of inaccurate identification due to an undeveloped subset that could eventually mislead or intensify people's actions. Additionally, there should be a specific model of training NLP made just for identifying human bias and heuristics, as all the above information I stated is mainly conceptual directions that need to be done practically.

Aesthetic appeal is analyzed from two perspectives in behavioral economics: bias and heuristics. These issues are addressed using Artificial Intelligence and Natural Language Processing for human identification. Since the impact of bias and heuristics can be significant, they have the potential to

influence entire generations or even transform industries, thereby affecting the future direction of society. Therefore, to determine whether an idea is based on bias or heuristics, the most practical and efficient tool is NLP, which can provide more balanced and diverse responses rather than unitary ones.

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